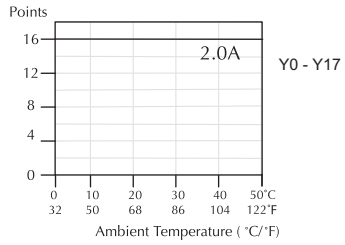
DL06 I/O Specifications

D0-06DR <--->

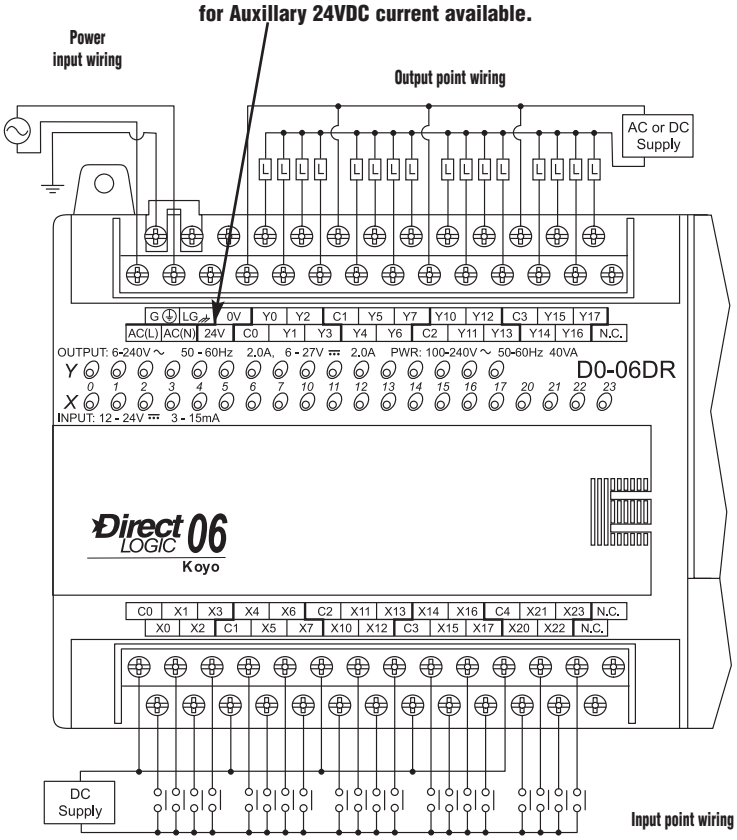
Wiring diagram and specifications

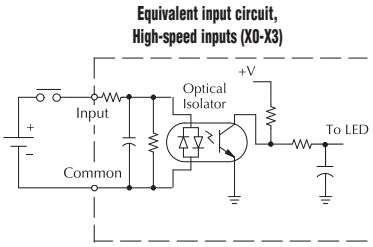
D0-06DR Specifications			
AC Power Supply Specifications	***Voltage Range***	100-240VAC (40VA)	
DC Input Specifications	***Number of Input Pts.***	20 (sink/source)	
	Number of Commons	5 (isolated)	
	Input Voltage Range	12-24VDC	
	Input Impedance	(X0-X3) 1.8K @ 12-24VDC (X4-X23) 2.8K @ 12-24VDC	
	On Current/ Voltage Level	>5mA/10VDC	
	OFF Current/ Voltage Level	<0.5mA/<2VDC	
	Response Time	X0-X3	X4-X23
	OFF to ON Response	<100µs	<8ms
	ON to OFF Response	<100µs	<8ms
	Fuses	None	
Relay Output Specifications	***Number of Output Points***	16	
	Number of Commons	4 (isolated)	
	Output Voltage Range	6-240VAC, 47-63Hz 6-27VDC	
	Maximum Voltage	264VAC,30VDC	
	Maximum Current	2A/point 6A/common	
	Maximum Leakage Current	0.1mA @ 246VAC	
	Smallest Recommended Load	5mA @ 5VDC	
	OFF to ON Response	<15ms	
	ON to OFF Response	<10ms	
	Status Indicators	Logic side	
	Fuses	None (external recommended)	

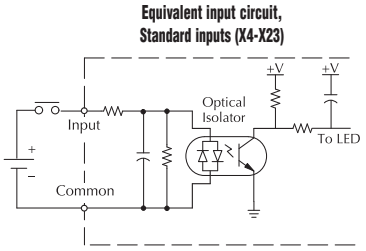
Derating chart for relay outputs

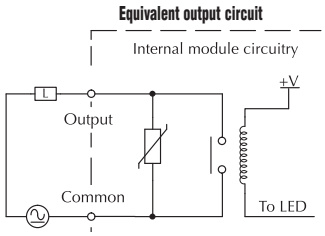


Note: Refer to page 2–29, Power Budgeting, for Auxillary 24VDC current available.


Power input wiring
Output point wiring
AC or DC Supply
G LG 0V Y0 Y2 C1 Y5 Y7 Y10 Y12 C3 Y15 Y17
AC(L) AC(N) 24V C0 Y1 Y3 Y4 Y6 C2 Y11 Y13 Y14 Y16 N.C.
OUTPUT: 6-240V ~ 50 - 60Hz 2.0A, 6 - 27V ⎓ 2.0A PWR: 100-240V ~ 50-60Hz 40VA
Y 0 1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 20 21 22 23
X 0 1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 20 21 22 23
INPUT: 12 - 24V ⎓ 3 - 15mA
D0-06DR
Direct LOGIC 06
Koyo
C0 X1 X3 X4 X6 C2 X11 X13 X14 X16 C4 X21 X23 N.C.
X0 X2 C1 X5 X7 X10 X12 C3 X15 X17 X20 X22 N.C.
DC Supply
Input point wiring







Typical Relay Life (Operations) at Room Temperature		
Voltage and Type of Load	***Load Current***	
	At 1A	***At 2A***
24 VDC Resistive	500K	250K
24 VDC Inductive	100K	50K
110 VAC Resistive	500K	250K
110 VAC Inductive	200K	100K
220 VAC Resistive	350K	200K
220 VAC Inductive	100K	50K

Features at a Glance

The DL05 and DL06 micro PLCs are complete self-contained systems. The CPU, power supply, and I/O are all included inside the same housing. Option modules are available to expand the capability of each PLC family for more demanding applications. The standard features of these PLCs are extraordinary and compare favorably with larger and more expensive PLCs.

The specification tables to the right are meant for quick reference only. Detailed specifications and wiring information for each model of the DL05 and DL06 PLCs begin on page 2–33.

Program capacity

Most boolean ladder instructions require a single word of program memory. Other instructions, such as timers, counters, etc., require two or more words. Data is stored in V-memory in 16-bit registers.

Performance

The performance characteristics shown in the tables represent the amount of time required to read the inputs, solve the Relay Ladder Logic program and update the outputs.

Instructions

A complete list of instructions is available at the end of this section.

Communications

The DL05 and DL06 offer powerful communication features normally found only on more expensive PLCs.

Special features

The DC input and DC output PLCs offer high-speed counting or pulse output. Option module slots allow for discrete I/O expansion, analog I/O, or additional communication options.

DL05 CPU Specifications

System capacity

Total memory available (words)	6K
Ladder memory (words)	2,048
V-memory (words)	4,096
User V-memory	3,968
Non-volatile user V-memory	128
Battery backup	Yes[1]
Total built-in I/O	14
Inputs	8
Outputs	6
I/O expansion	Yes[1]

Performance

Contact execution (Boolean)	0.7µs
Typical scan (1K Boolean)[2]	1.5-3ms.

Instructions and diagnostics

RLL ladder style	Yes
RLLPLUS/flowchart style (Stages)	Yes/256
Run-time editing	Yes
Scan	Variable/fixed
Number of Instructions	133
Types of Instructions:	
Control relays	512
Timers	128
Counters	128
Immediate I/O	Yes
Subroutines	Yes
For/next loops	Yes
Timed interrupt	Yes
Integer math	Yes
Floating-point math	No
PID	Yes
Drum sequencers	Yes
Bit of word	Yes
ASCII print	Yes
Real-time clock/calendar	Yes[1]
Internal diagnostics	Yes
Password security	Yes
System and user error log	No

Communications

Built-in ports	Two RS-232C
Protocols supported:	
K-sequence (proprietary protocol)	Yes
DirectNet master/slave	Yes
Modbus RTU master/slave	Yes
ASCII out	Yes
Baud rate	
Port 1	9,600 baud (fixed)
Port 2	selectable 300-38,400 baud (default 9,600)

Specialty Features

Filtered inputs	Yes[3]
Interrupt input	Yes[3]
High speed counter	Yes, 5kHz[3]
Pulse output	Yes, 7kHz[3]
Pulse catch input	Yes[3]

1- These features are available with use of certain option modules. Option module specifications are located later in this section.

2- Our 1K program includes contacts, coils, and scan overhead. If you compare our products to others, make sure you include their scan overhead.

3- Input features only available on units with DC inputs and output features only available on units with DC outputs.

DL06 CPU Specifications

System capacity

Total memory available (words)	14.8K
Ladder memory (words)	7680
V-memory (words)	7616
User V-memory	7488
Non-volatile user V-memory	128
Built-in battery backup (D2-BAT-1)	Yes
Total I/O	36
Inputs	20
Outputs	16
I/O expansion	Yes1

Performance

Contact execution (Boolean)	0.6µs
Typical scan (1K Boolean)2	1-2ms.

Instructions and diagnostics

RLL ladder style	Yes
RLLPLUS/flowchart style (Stages)	Yes/1024
Run-time editing	Yes
Scan	Variable/fixed
Number of Instructions	229
Types of Instructions:	
Control relays	1024
Timers	256
Counters	128
Immediate I/O	Yes
Subroutines	Yes
For/next loops	Yes
Table functions	Yes
Timed interrupt	Yes
Integer math	Yes
Trigonometric functions	Yes
Floating-point math	Yes
PID	Yes
Drum sequencers	Yes
Bit of word	Yes
Number type conversion	Yes
ASCII in, out, print	Yes
LCD instruction	Yes
Real-time clock/calendar	Yes
Internal diagnostics	Yes
Password security	Yes
System and user error log	No

Communications

Built-in ports:	One RS-232C
	One multi-function RS232C/RS422/RS485

NOTE: RS485 is for MODBUS RTU only.

Protocols supported:	
K-sequence (proprietary protocol)	Yes
DirectNet master/slave	Yes
Modbus RTU master/slave	Yes
ASCII in/out	Yes
Baud rate	
Port 1	9,600 baud (fixed)
Port 2	selectable 300-38,400 baud (default 9,600)

Specialty Features

Filtered inputs	Yes[3]
Interrupt input	Yes[3]
High speed counter	Yes, 7kHz[3]
Pulse output	Yes, 10kHz[3]
Pulse catch input	Yes[3]

1- These features are available with use of certain option module. Option module specifications are located later in this section.

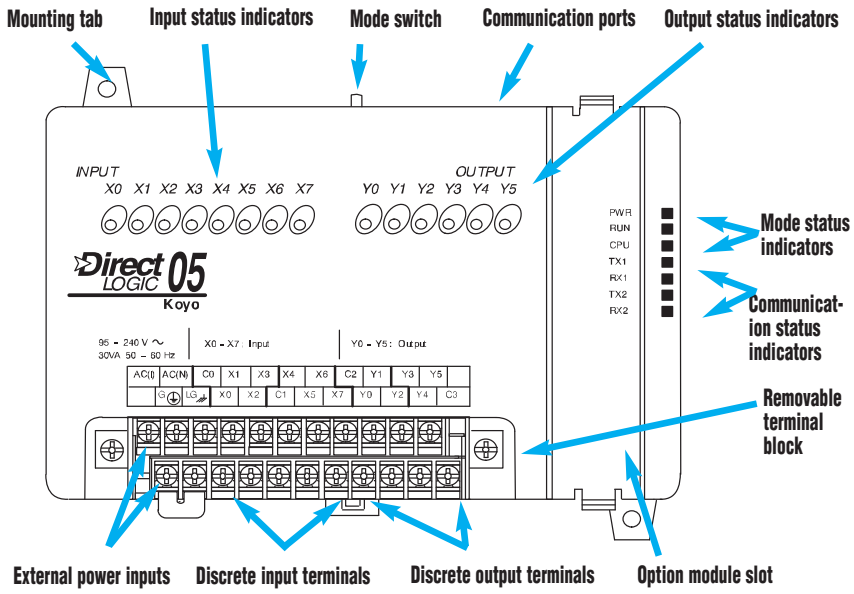
2- Our 1K program includes contacts, coils, and scan overhead. If you compare our products to others, make sure you include their scan overhead.

3- Input features only available on units with DC inputs and output features only available on units with DC outputs.

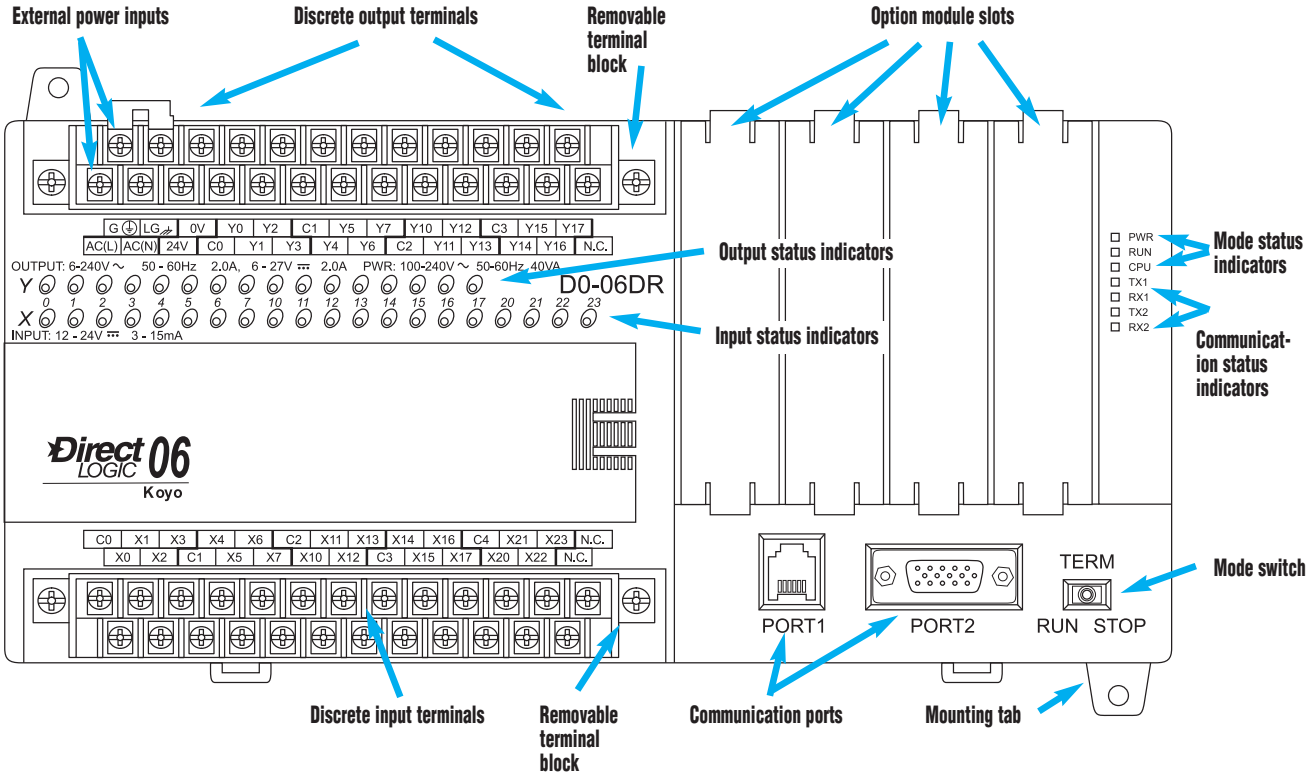
Features at a Glance

*Direct*SOFT software

The DL05 and DL06 PLCs use the same familiar *Direct*SOFT programming software that our larger PLCs use. A FREE version of *Direct*SOFT gives you all the great features of the full version, but with a 100-word PLC program download limitation. For programs larger than 100 words, the full package is required. The FREE PC-DS100 software may be sufficient to program the DL05 and DL06. If you are programming with a full package version prior to v5.0, you will need v2.4 or later for the DL05 PLCs and v4.0 or later for the DL06. We always recommend the latest version for the most robust features. See the Software section in this catalog for a complete description of *Direct*SOFT including features, part numbers of programming packages and upgrades.



Hardware features diagrams

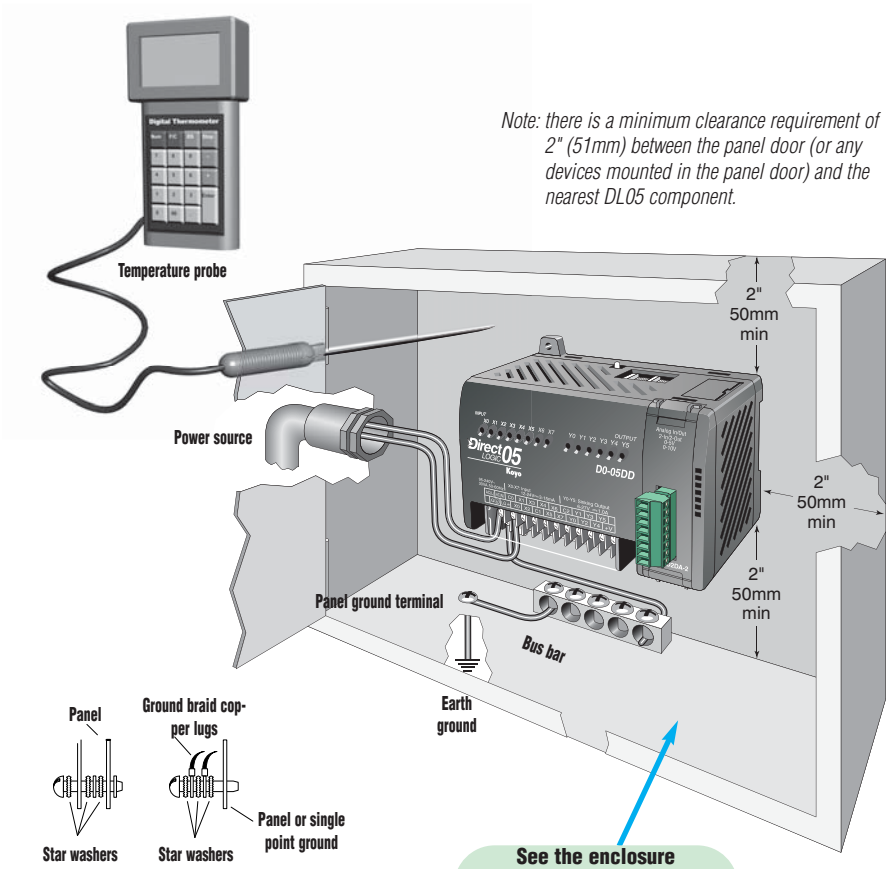


Product Dimensions and Installation

It is important to understand the installation requirements for your DL05 or DL06 system. Your knowledge of these requirements will help ensure that your system operates within its environmental and electrical limits.

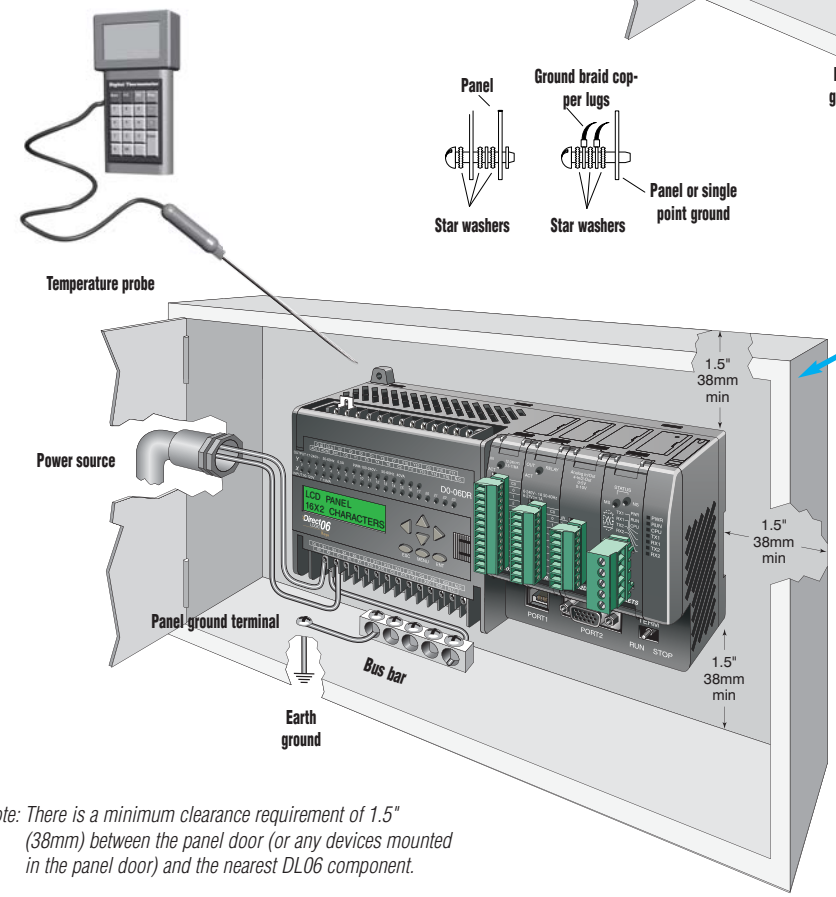
Plan for safety

This catalog should never be used as a replacement for the user manual. You can purchase, download free, or view online the user manuals for these products. The D0-USER-M is the publication for the DL05 PLCs, and the D0-06USER-M is the publication for the DL06 PLCs. The D0-OPTIONS-M is the user manual for the option modules. These user manuals contain important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.



Note: there is a minimum clearance requirement of 2" (51mm) between the panel door (or any devices mounted in the panel door) and the nearest DL05 component.

See the enclosure section to find an enclosure that fits your application



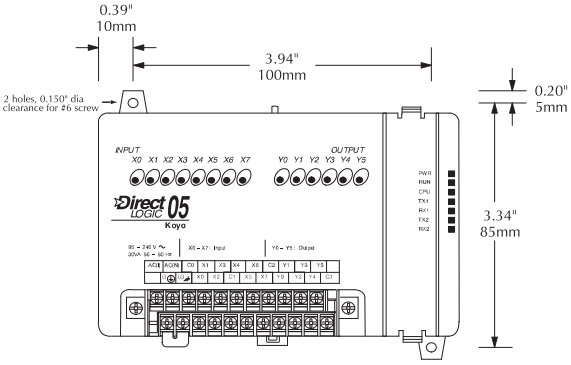
Note: There is a minimum clearance requirement of 1.5" (38mm) between the panel door (or any devices mounted in the panel door) and the nearest DL06 component.

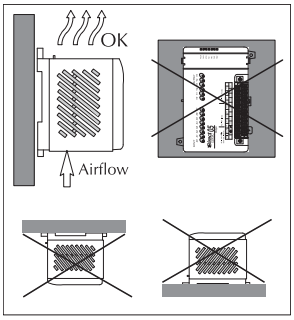
Environmental Specifications for DL05 and DL06	
Storage Temperature	-4º F-158ºF (-20ºC to 70ºC)
Ambient Operating Temperature	32ºF-131ºF (0º to 55ºC)
Ambient Humidity	5 to 95% relative humidity (non-condensing)
Vibration Resistance	MIL STD 810C Method 514.2
Shock Resistance	MIL STD 810C Method 516.2
Noise Immunity	NEMA (ICS3-304)
Atmosphere	No corrosive gases

Product Dimensions and Installation

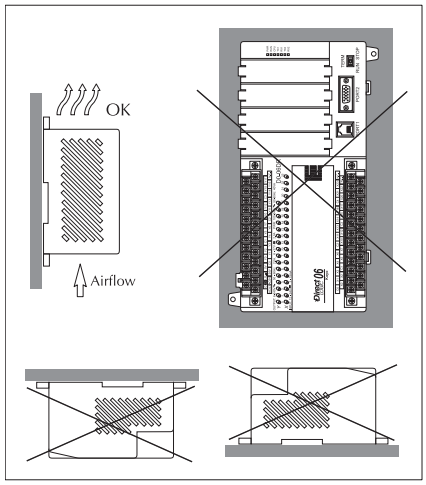
Unit dimensions and mounting orientation

DL05 and DL06 PLCs must be mounted properly to ensure ample airflow for cooling purposes. It is important to follow the unit orientation requirements and to verify that the PLC's dimensions are compatible with your application. Notice particularly the grounding requirements and the recommended cabinet clearances.

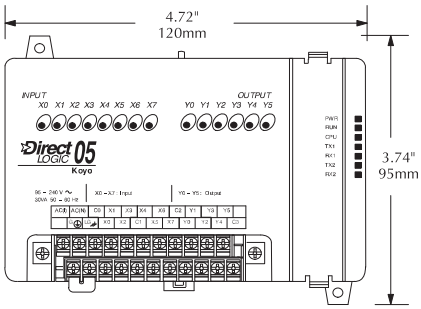


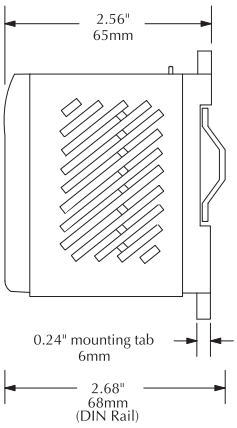


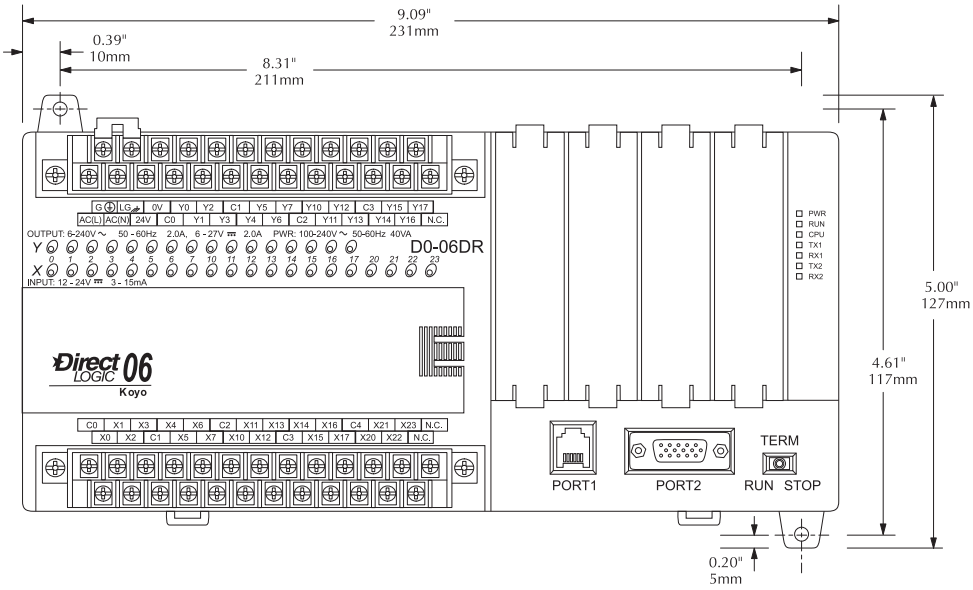
Mounting orientation

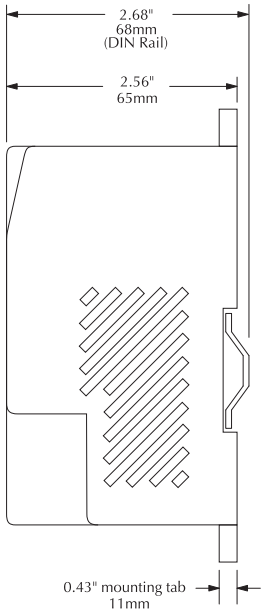


Mounting orientation









Choosing the I/O Type

DL06 Base Unit I/O Table							
Part Number	Inputs			Outputs			Price
	I/O Type/ Commons	Sink or source	Voltage Ranges	I/O Type/ Commons	Sink or Source	Voltage/Current Ratings	
D0-06AA	AC/5	N/A	90-120VAC	AC/4	N/A	17-240VAC, 0.5A 50/60 Hz	<--->
D0-06AR	AC/5	N/A	90-120VAC	Relay/4	N/A	6-27VDC, 2A 6-240VAC, 2A	<--->
D0-06DA	DC/5	Sink or source	12-24VDC	AC/4	N/A	17-240VAC, 0.5A 50/60Hz	<--->
D0-06DD1	DC/5	Sink or source	12-24VDC	DC/4	Sink	6-27VDC, 0.5A (Y0-Y1) 6-27VDC, 1.0A (Y2-Y17)*	<--->
D0-06DD2	DC/5	Sink or source	12-24VDC	DC/4	Source	12-24VDC, 0.5A (Y0-Y1) 12-24VDC, 1.0A (Y2-Y17)	<--->
D0-06DR	DC/5	Sink or source	12-24VDC	Relay/4	N/A	6-27VDC, 2A 6-240VAC, 2A	<--->
D0-06DD1-D	DC/5	Sink or source	12-24VDC	DC/4	Sink	6-27VDC, 0.5A (Y0-Y1) 6-27VDC, 1.0A (Y2-Y17)*	<--->
D0-06DD2-D	DC/5	Sink or source	12-24VDC	DC/4	Source	12-24VDC, 0.5A (Y0-Y1) 12-24VDC, 1.0A (Y2-Y17)	<--->
D0-06DR-D	DC/5	Sink or source	12-24VDC	Relay/4	N/A	6-27VDC, 2A 6-240VAC, 2A	<--->

*** These outputs must be derated to 0.6A for EN61131-2 compliance.**

Discrete I/O Option Moduless							
Part Number	Inputs			Outputs			Price
	I/O Type/ Number/ Commons	Sink or source	Voltage Ranges	I/O Type/ Number/ Commons	Sink or Source	Voltage/Current Ratings	
D0-07CDR	DC/4/1	Sink or source	12-24VDC	Relay/3/1	N/A	6-27VDC, 1A 6-240VAC, 1A	<--->
D0-08CDD1	DC/4/2	Sink or source	12-24VDC	DC/4/2	Sink	6-27VDC, 0.3A	<--->
D0-08TR	N/A	N/A	N/A	Relay/8/2	N/A	6-27VDC, 1A 6-240VAC, 1A	<--->
D0-10ND3	DC/10/2	Sink or source	12-24VDC	N/A	N/A	N/A	<--->
D0-10ND3F	DC/10/2	Sink or source	12-24VDC	N/A	N/A	N/A	<--->
D0-10TD1	N/A	N/A	N/A	DC/10/2	Sink	6-27VDC, 0.3A	<--->
D0-10TD2	N/A	N/A	N/A	DC/10/2	Source	12-24VDC, 0.3A	<--->
D0-16ND3	DC/16/4	Sink or source	20-28VDC	N/A	N/A	N/A	<--->
D0-16TD1	N/A	N/A	N/A	DC/16/2	Sink	6-27VDC, 0.1A	<--->
D0-16TD2	N/A	N/A	N/A	DC/16/2	Source	12-24VDC, 0.1A	<--->
F0-04TRS	N/A	N/A	N/A	Relay/4/4	N/A	5-30VDC, 3A 5-125VAC, 3A	<--->
F0-08NA-1	AC/8/2	N/A	80-132VAC 90-150VDC	N/A	N/A	N/A	<--->
F0-08SIM	8-pt. Input simulator						<--->

Communications and Specialty Option Modules		
Part Number	Description	Price
H0-ECOM	Ethernet Communications Module 10 Mbit	<--->
H0-ECOM100	Ethernet Communications Module 10/100 Mbit	<--->
D0-DEVNETS	DeviceNET Slave Module	<--->
H0-CTRIO	High Speed Counter I/O Module	<--->
H0-PSCM	Profibus Slave Communications Module	<--->
D0-DCM	Serial Communications Module	<--->
F0-CP128	ASCII CoProcessor Module	<--->

Analog I/O

By using option modules, you can add analog inputs or outputs to your DL05 or DL06 PLC. The table below shows the input and output types at a glance. Detailed specifications are provided later in this section.

Analog I/O Option Modules					
Part Number	Inputs		Outputs		Price
	No.	Input Type	No.	Output Type	
F0-04AD-1	4	0-20mA or 4-20mA	0	N/A	<--->
F0-04AD-2	4	0-5VDC or 0-10VDC	0	N/A	<--->
F0-08ADH-1	8	0-20mA	0	N/A	<--->
F0-08ADH-2	8	0-5VDC or 0-10VDC	0	N/A	<--->
F0-04DAH-1	0	N/A	4	4-20mA	<--->
F0-08DAH-1	0	N/A	8	4-20mA	<--->
F0-04DAH-2	0	N/A	4	0-10VDC	<--->
F0-08DAH-2	0	N/A	8	0-10VDC	<--->
F0-4AD2DA-1	4	0-20mA or 4-20mA	2	0-20mA or 4-20mA	<--->
F0-2AD2DA-2	2	0-5VDC or 0-10VDC	2	0-5VDC or 0-10VDC	<--->
F0-4AD2DA-2	4	0-5VDC or 0-10VDC	2	0-5VDC or 0-10VDC	<--->
F0-04RTD	4	RTD	0	N/A	<--->
F0-04THM*	4	Thermo-couple / Voltage	0	N/A	<--->

*** See module specifications page for thermocouple types and voltage input ranges supported**

Power budgeting

No power budgeting is necessary for the DL05. The built-in power supply is sufficient for powering the base unit, any of the option modules, the hand-held programmer, and even a DV1000 operator interface.

Power budgeting is necessary for the DL06. With four option module slots and an optional LCD display, it is necessary to verify that sufficient power is available for all optional devices. Power budgeting is described in detail on page 2-29 and in the DL06 User Manual.